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A REVISED ESTIMATE OF THE COST TO COMPLETE THE NATIONAL SYSTEM OF INTERSTATE AND DEFENSE HIGHWAYS

REPORT

FROM

THE SECRETARY OF TRANSPORTATION

TRANSMITTING

A REVISED ESTIMATE OF THE COST TO COMPLETE THE NATIONAL SYSTEM OF INTERSTATE AND DEFENSE HIGHWAYS, PURSUANT TO THE PROVISIONS OF SECTION 104(b)5, TITLE 23, UNITED STATES CODE

JUNE 1989

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THE DEPUTY SECRETARY OF TRANSPORTATION,
Washington, DC, January 26, 1989.

Hon. JIM WRIGHT, SPEAKER OF THE HOUSE OF REPRESENTATIVES,
WASHINGTON, DC.

DEAR MR. SPEAKER: In accordance with the requirements of Section 104(b)(5)(A), Title 23, United States Code, I am transmitting a Revised Estimate of the Cost to Complete the National System of Interstate and Defense Highways prepared for the purpose of determining apportionment factors for Interstate System funds authorized for the fiscal years ending September 30, 1991, and September 30, 1992.

The factors contained in this estimate are derived from the review and analysis of estimates of costs set forth in bound volumes of individual State reports. Because of their bulk, the State reports are being sent directly to the House Committee on Public Works and Transportation.

This estimate includes the costs for the construction necessary to provide a minimum level of acceptable service on the Interstate System as defined in the Federal-Aid Highway Act of 1981, which amended subsection (b) of Section 108 of the Federal-Aid Highway Act of 1956, and the provisions of the Surface Transportation and Uniform Relocation Assistance Act of 1987. This estimate has been prepared as a joint effort by the Federal Highway Administration and the State highway agencies using uniform procedures. The factors herein reflect proportionate needs based on completion of the Interstate System in accordance with Section 108(b) of the Federal-Aid Highway Act of 1956, as amended.

Sincerely,

MIMI WEYFORTH DAWSON.

Enclosure.

THE 1989 INTERSTATE SYSTEM COST ESTIMATE - A REPORT OF FACTORS FOR USE IN APPORTIONING FUNDS FOR THE NATIONAL SYSTEM OF INTERSTATE AND DEFENSE HIGHWAYS

EXECUTIVE SUMMARY

The remaining cost to complete the Interstate System is estimated, as of January 1, 1988, to be $16.3 billion, of which $14.8 billion is the Federal share. The estimated total cost of the entire System when completed is $124.9 billion, with a Federal share of $111.0 billion. This is an overall cost increase of $3.9 billion from the total cost in the 1987 Interstate Cost Estimate.

The 1989 Interstate Cost Estimate has been prepared by the Federal Highway Administration and the individual State highway agencies in accordance with Section 4(c) of the Federal-Aid Highway Act of 1981 and includes only the estimated costs of those design concepts, locations, geometrics and other construction features included in the 1981 Interstate Cost Estimate except where the Secretary has determined a Federal law requires a change to those designs, locations, geometrics or other construction features. In accordance with Section 4(b), the work represented in the 1989 estimate basically includes completion of gaps, major upgrading of incorporated segments which were not built with Interstate funds, essential stage construction, and added mixed traffic lanes and high occupancy vehicle lanes included in the 1981 estimate. Costs for essential environmental requirements are included as part of gap or major upgrading projects as appropriate.

The added authorizations and other provisions of the Surface Transportation Assistance Act of 1982 and the Surface Transportation and Uniform Relocation Assistance Act of 1987 have been considered to the extent appropriate in the preparation of this estimate. In accordance with the requirements of Title 23, United States Code (23 U.S.C.), Section 104(b)(5), Table 5 of this report presents the factors for apportioning Interstate construction funds for fiscal years 1991 and 1992.

PURPOSE AND SCOPE OF REPORT

Section 104(b)(5)(A), Title 23, United States Code ("Highways"), requires the Secretary of Transportation to make a revised estimate of the cost of completing the designated Interstate Highway System and transmit that report to the Senate and the House of Representatives.

The purpose of the estimate, as summarized in Table 5, is to derive the ratio of the Federal share of the estimated cost of completing the Interstate System in each State to the sum of the Federal share of these costs in all the States to serve as a basis of apportioning funds authorized for the fiscal years 1991 and 1992. This method of apportionment is specified in 23 U.S.C. 104(b)(5)(A). (Note that Interstate construction funds are apportioned a year in advance of authorization; thus fiscal years 1991 and 1992 funds are apportioned in fiscal years 1990 and 1991, respectively).

The estimate for apportionment purposes, presented herein, is the 14th of a series of estimates to be submitted to the Congress in accordance with the law. Following is a tabulation of previous cost estimates along with congressional document reference numbers and fiscal year of funding in which each was used to apportion funds:

Date Submitted	Document Number	Congress	Session	Fiscal Year Apportionment
January 1958	House Doc. 300	85th	2nd	1960,1961,1962
January 1961	House Doc. 49	87th	1st	1963,1964,1965,1966
January 1965	House Doc. 42	89th	1st	1967,1968,1969
January 1968	House Doc. 199	90th	2nd	1970,1971
April 1970	House Doc. 91-317	91st	2nd	1972,1973
January 1972	Comm. Print 92-29	92nd	2nd	1974,1975,1976
July 1975	Comm. Print 94-14	94th	1st	1977
Revision	Comm. Print 94-38	94th	2nd	1978
May 1977	Comm. Print 95-11	95th	1st	--
Revision	Comm. Print 95-16	95th	1st	1979
Revision	Comm. Print 95-49	95th	2nd	1980
August 1979	Comm. Print 96-14	96th	1st	--
Revision	Comm. Print 96-15	96th	1st	1981,1982
January 1981	Comm. Print 97-1	97th	1st	--
Revision	Comm. Print 97-28	97th	1st	1983
Revision	Comm. Print 97-53	97th	2nd	1984
March 1983	Comm. Print 98-1	98th	1st	--
Revision (to 97-53)	Comm. Print 98-10	98th	2nd	one-half 1985
January 1985	Comm. Print 99-1	99th	1st	--
Revision	Comm. Print 99-2	99th	1st	Remainder 1985 & 1986
Revision	Comm. Print 99-68	99th	1st	1987
January 1987	Comm. Print 100-4	100th	1st	--
Revision	Comm. Print 100-5	100th	1st	1988
Revision*	" " " (Administratively Adjusted)			1989
Revision*	" " " "		"	1990

* The Surface Transportation and Uniform Relocation Assistance Act of 1987 modified Section 104(b)(5)(A) of Title 23 to require the Secretary to administratively adjust the last Interstate Cost Estimate and make apportionments on October 1 of each of fiscal years 1988 through 1991, whenever Congress has not approved a cost estimate. Fiscal Year 1989 and 1990 funds were apportioned on this basis.

The cost presented in this report for completing the Interstate System represents work eligible for Interstate construction funds as defined in Section 4(b) of the Federal-Aid Highway Act of 1981 which amended Section 108(b) of the 1956 Federal-Aid Highway Act, and work eligible in accordance with the provisions of the Surface Transportation Assistance Act of 1982 and the Surface Transportation and Uniform Relocation Assistance Act of 1987. The eligibility criteria are detailed in the 1989 Interstate Cost Estimate Instruction Manual and include essential work for gap construction and major upgrading of incorporated segments which have had no major Interstate funding, including essential environmental requirements; essential stage construction; and approved additional mixed traffic lane and high occupancy vehicle lane projects which were included in the 1981 estimate. In addition to the estimate of the cost of completing the Interstate System, there is included in this report an estimate of the total cost of the System covering past obligations against the Highway Trust Fund together with State matching funds. The latter total cost estimate is summarized in Tables 6 and 7 showing a comparison of the present estimated costs with the estimate presented to the Congress in the 1987 estimate.

DESIGNATED SYSTEM COVERED BY THIS ESTIMATE

The National System of Interstate and Defense Highways, known as the Interstate System, was designated under authority in the Federal-Aid Highway Act of 1944. The System under the original authorization was not to exceed 40,000 miles in total length and was located to connect by routes as direct as practicable, the principal metropolitan areas, cities, and industrial centers, to serve the national defense and to connect at suitable border points with the routes of continental importance in the Dominion of Canada and the Republic of Mexico.

The Interstate System was selected by joint action of the State highway departments and the Bureau of Public Roads, and routes comprising an estimated 37,700 miles were designated on August 2, 1947. Additional routes, limited to those around and through the urban areas and totaling an estimated 2,300 miles, were designated in September 1955. At the time of the initial System designations, detailed location studies with the necessary engineering and economic analyses were lacking. The locations, therefore, were diagrammatic only, and the designated mileages were those of the measured length of the existing principal highways lying generally on the chosen locations. Further studies led to definite locations based upon more precise engineering and economic information. The length of the System, so established, was determined to be 38,548 miles for routes included in the first estimate submitted to the Congress in January 1958.

Section 108(1) of the 1956 act (later largely codified as part of Title 23, United State Code) increased the statutory maximum length of the Interstate System from 40,000 to 41,000 miles, but the legislation specifically excluded the cost of the routes which would be designated as a result of the additional 1,000 miles, from the estimate to be used for apportionment purposes. The Federal-Aid Highway Act of 1960 included an amendment of Title 23, United States Code, which removed this restriction from the law.

On October 18, 1957, 2,102 miles of Interstate routes were added to the System. The addition of these routes was possible because of the 1,000-mile extension authorized by the 1956 Act, and the availability of 1,102 miles of the original 40,000 mile authorization, through savings in mileage resulting from the definite location and the more accurate measurement of the System as described in earlier paragraphs. A reserve of 350 miles was held to cover possible increases in lengths of designated routes.

Section 17 of the Hawaii Omnibus Act included an amendment to 23 U.S.C. which (1) removed the limitation that the Interstate System be designated entirely within the continental United States, (2) provided for the apportionment from the Highway Trust Fund to Hawaii of $12,375,000 of Interstate funds for the fiscal year ending June 30, 1962, and (3) provided for the apportionment to Hawaii of Interstate funds for subsequent fiscal years pursuant to the provisions of 23 U.S.C. 104(b)(5). Under the provisions of this amendment, the Federal Highway Administrator approved in August 1960 the addition of three routes to the National System of Interstate and Defense Highways on the island of Oahu in the State of Hawaii. These additions to the System were included in the 1961 and subsequent estimates.

Not all of the routes expected to be added to the System under the 1,102 miles available from the original 40,000 miles were designated at the time of the 1961 and 1965 estimates. The costs of the segments not on finally approved location, totalling about 220 miles, were entered in the 1961 estimate at a cost of $1 million per mile. The mileage reserved for final System measurement, approximately 308 miles, was also entered in the 1961 estimate at $1 million per mile.

During the period between the 1961 estimate and the January 1, 1964, cutoff date for the 1965 estimate, all but 93 miles of the route segments represented in the 220-mile group cited above had been given final location approval and were included in the 1965 estimate at the then current estimate of cost for their construction.

The cost of the segments not on final approved locations, totalling about 93 miles, were entered in the 1965 estimate at a cost of $5 million per mile. The mileage reserved for final measurement, approximately 21 miles, was also entered in the 1965 estimate at $5 million per mile.

During the period between the 1965 estimate and the January 1, 1967, cutoff date for the 1968 estimate, most of the route segments represented in the 93-mile group cited above were given final location approval and included in

the 1968 estimate. Thirty-one miles, reserved for final measurement in the 1968 estimate, were estimated at $10 million per mile.

The Federal-Aid Highway Act of 1968 authorized an additional 1,500 miles on the Interstate System. On December 13, 1968, routes totalling 1,473 miles from the additional authorizations were designated.

During the period between the 1968 estimate and the November 1, 1969, cutoff date for the 1970 estimate, all but 5 miles were given final location approval and included in the 1970 estimate. The 5 miles reserved for final measurement in the 1970 estimate were included in the estimate at $10 million per mile.

Subsequent adjustments to the System, including new routes, have been made. The Surface Transportation Assistance Act of 1978 specified in Section 140 that Interstate routes be designated in Los Angeles, California, and in Erie and Onondaga Counties, New York. Section 209 of the Supplemental Appropriations Act for 1978 provided for the designation of a spur in Tacoma, Washington, while Section 311 of the Appropriations Act for 1980 provided for the extension of I-164 in Evansville, Indiana. Finally, the Appropriations Act for 1981, in Section 310, provided for extension of I-170 in St. Louis and the designation of I-210 in Alabama, a connector in the vicinity of Mobile-Prichard. All these routes have been designated and the estimated costs for constructing the routes are included in the same manner as other toll free routes.

Public Law 90-238, approved January 2, 1968, amended Section 103, Title 23, United States Code, to authorize an additional 200 miles for the Interstate System to be used for adjustments in the System without an increase to the cost. This provision was amended by both the 1973 and 1976 Federal-Aid Highway Acts, which increased this mileage increment from 200 to 500 miles and also revised the method for determining amounts available for such adjustments. The Surface Transportation Assistance Act of 1978 further amended this provision to provide full funding of the routes designated under this provision and to prohibit additional route designations. Adjustments under 23 U.S.C. 103(e)(2) have been made in 10 States.

The System to be constructed with Interstate construction funds apportioned under 23 U.S.C. 104(b)(5)(A) consists of system mileage designated under Section 103(e)(1) and 103(e)(2) totalling 42,392 miles and 405 miles respectively as of December 31, 1987. With a reserve of 108 miles available for the more precise measurement of routes as final plans and locations are developed, the final system measurements are expected to keep the total mileage within the authorized limit. The basic system mileage plus the 405 miles designated under Section 103(e)(2) are shown in Table 1 and Table 2.

Table 1 shows the System mileage as it was reported in the 1987 estimate, and as it exists for the 1989 estimate.

TABLE 1 - 1987 and 1989 Mileage Estimates

1987 Estimate:

System mileage reported in the 1985 estimate, and System additions and adjustments reported by States in this estimate	42,392
Reserved for final measurement	108
System mileage designated under 23 U.S.C. 103(e)(2)	404
Total mileage	42,904

1989 Estimate:

System mileage reported in the 1987 estimate, and System additions and adjustments reported by States in this estimate	42,392
Reserved for final measurement	108
System mileage designated under 23 U.S.C. 103(e)(2)	405
Total mileage	42,905

The 1973 Federal-Aid Highway Act further amended 23 U.S.C. 103, adding subsection (e)(4) to permit the withdrawal of routes or segments in urbanized areas and the substitution of nonhighway public mass transit projects. Only those routes or segments which were not essential to a unified and connected system were eligible for withdrawal. The provision was revised by the 1976 Federal-Aid Highway Act to also permit the withdrawal of segments connecting urbanized areas within a State and the substitution of highway projects in addition to nonhighway transit projects. The 1978 Federal-Aid Highway Act prohibited withdrawals after September 30, 1983, except for certain routes under injunction. The 1982 Surface Transportation Assistance Act further extended the provisions to rural segments and authorized funding from the Highway Trust Fund of substitute highway projects. Forty-nine separate actions involving the withdrawal of 343 miles have been approved under this provision. The costs for withdrawn segments are not included in this estimate.

The 1970 Federal-Aid Highway Act amended 23 U.S.C. 129, by adding new subsection (e), for the purpose of permitting "Federal participation in the (cost of) reconstruction, and improvement of any toll road providing for only two lanes of traffic, which is designated as part of the Interstate System on date of enactment of this subsection . . . to bring such two-lane toll road to the geometric and construction standards of the Interstate System . . . to facilitate the removal of tolls therefrom." The 1973 Federal-Aid Highway Act amended this new provision to apply to any two-lane toll roads designated as part of the Interstate System on or before June 30, 1973. The amended subsection applies to a portion of I-77, the West Virginia Turnpike, a segment of I-790 in Utica, New York, and a portion of I-75, Alligator Alley, in Florida. The costs shown in this estimate for these routes are estimated and reported in the same manner as for other free routes.

The Federal-Aid Highway Act of 1968 added Section 139 to 23 U.S.C., to permit Interstate designation of highway segments on the Federal-aid primary system at the request of the State or States involved, if the segments meet all of the standards for highways on the Interstate System and if they are logical additions or connections. Mileage designated under this section is not chargeable as part of the limitation established in 23 U.S.C. 103 and creates no Interstate construction funding responsibility. Hence, no costs for work on segments designated under this section are included in this estimate.

Plate A shows the location of the designated routes which form the basis for this estimate. Table 2 shows the mileage of the Interstate System and other Federal-aid highway systems in each of the States. Mileage designated under 23 U.S.C. 139 is not included in the Interstate system mileage of Table 2.

UNIFORM APPLICATION OF STANDARDS

Section 109(b), of 23 U.S.C., provides that the geometric and construction standards to be adopted for the Interstate System shall be those adopted by the Secretary in cooperation with the State highway departments. The section was amended in 1963 to provide that such standards shall be adequate to accommodate the types and volumes of traffic anticipated for a project for the 20-year period commencing from actual construction of such projects. Section 109(b) was further amended in 1966 to state that the standards for the Interstate System shall in all cases provide for at least four lanes of traffic. However, this provision was modified by subsequent legislation to permit the construction of special purpose roadways and special projects of less than four lanes.

Section 109(b) provides also that the Secretary shall apply the standards uniformly throughout the States. Appropriate committees composed of State and Federal engineers, working under the sponsorship of the American Association of State Highway and Transportation Officials (AASHTO), developed the geometric design standards for the Interstate System. These standards were adopted by AASHTO on July 12, 1956, and approved July 17, 1956, by the Commissioner of Public Roads, acting for the Secretary. Revisions to the standards have been adopted by AASHTO and approved for the Secretary as the need for these changes occurred.

Section 104(b)(5)(A), of 23 U.S.C., provides that the Secretary shall make the revised estimate of the cost of completing the Interstate System on the basis of the standards referred to above and in accordance with rules and regulations adopted by the Secretary and applied uniformly to all of the States. The instruction manual developed for this estimate cited these standards. This manual, together with the standards, guides, specifications, and laws to which it makes reference, and the clarification of the manual provisions served as the "rules and regulations" for preparation of the estimate.

The Federal-Aid Highway Act of 1981, in Section 4(b), redefined construction eligibility for obligation of Interstate construction funding. The Act did not change design standards, which are applied uniformly to all States. Eligible projects under the redefinition include gap completion, major upgrading of incorporated segments, approved stage construction, and the addition of mixed lanes and high occupancy vehicle lanes where approved and included in the 1981 estimate. Where such work is eligible on these projects, the estimate reflects

PLATE A

THE NATIONAL SYSTEM OF INTERSTATE AND DEFENSE HIGHWAYS

TABLE 2
ESTIMATE OF DESIGNATED
FEDERAL-AID HIGHWAY SYSTEM MILEAGES
JANUARY 1, 1968

STATE	INTERSTATE	OTHER FEDERAL-AID PRIMARY	FEDERAL-AID SECONDARY	FEDERAL-AID URBAN	TOTAL
ALABAMA	907	6,855	11,534	2,914	22,210
ALASKA	---	2,390	2,866	254	5,510
ARIZONA	1,167	3,492	3,228	3,021	10,908
ARKANSAS	526	5,380	7,257	1,186	14,349
CALIFORNIA	2,312	11,293	11,256	18,321	43,182
COLORADO	951	4,306	3,403	2,299	10,959
CONNECTICUT	291	1,388	902	2,957	5,538
DELAWARE	41	445	602	306	1,394
DIST. OF COLUMBIA	14	174	---	232	420
FLORIDA	1,460	7,949	4,401	6,038	19,848
GEORGIA	1,200	10,311	14,054	4,057	29,622
HAWAII	51	521	484	334	1,390
IDAHO	612	2,692	4,197	767	8,268
ILLINOIS	1,715	11,156	12,980	6,874	32,725
INDIANA	1,137	5,055	9,577	4,951	20,720
IOWA	782	9,031	13,504	2,526	25,843
KANSAS	821	8,170	22,610	1,618	33,219
KENTUCKY	741	3,941	7,256	1,910	13,848
LOUISIANA	872	3,171	7,349	2,136	13,528
MAINE	315	2,063	2,745	718	5,841
MARYLAND	394	2,274	1,920	2,244	6,832
MASSACHUSETTS	462	2,332	2,007	5,904	10,705
MICHIGAN	1,173	7,437	17,036	5,425	31,071
MINNESOTA	913	9,331	16,590	2,238	29,072
MISSISSIPPI	683	6,063	11,747	1,757	20,250
MISSOURI	1,153	6,838	18,217	2,466	28,674
MONTANA	1,187	5,463	4,701	320	11,671
NEBRASKA	481	7,213	11,457	1,066	20,217
NEVADA	543	1,886	2,363	599	5,391
NEW HAMPSHIRE	219	1,170	1,228	733	3,350
NEW JERSEY	422	1,554	1,754	5,447	9,177
NEW MEXICO	998	3,574	3,938	590	9,100
NEW YORK	1,393	8,536	6,281	8,768	24,978
NORTH CAROLINA	848	4,895	10,334	2,868	18,945
NORTH DAKOTA	571	5,540	10,566	483	17,160
OHIO	1,530	6,610	11,605	7,918	27,663
OKLAHOMA	809	5,508	11,392	3,060	20,769
OREGON	720	5,083	7,821	2,054	15,678
PENNSYLVANIA	1,564	9,990	7,962	6,995	26,511
RHODE ISLAND	71	391	204	880	1,546
SOUTH CAROLINA	772	5,900	8,580	1,236	16,488
SOUTH DAKOTA	679	5,803	11,026	393	17,901
TENNESSEE	1,037	6,164	5,458	3,172	15,831
TEXAS	3,163	17,117	32,727	8,084	61,091
UTAH	941	2,606	2,695	1,046	7,288
VERMONT	320	1,163	1,950	289	3,722
VIRGINIA	1,066	5,584	10,297	3,552	20,498
WASHINGTON	764	5,179	7,276	4,289	17,508
WEST VIRGINIA	515	2,445	6,366	786	10,112
WISCONSIN	578	9,377	12,845	3,020	25,820
WYOMING	914	2,996	2,278	659	6,847
PUERTO RICO	---	577	866	634	2,077
TOTAL	42,797	266,382	401,692	152,394	863,265

Interstate system mileage includes 406 miles designated under 23 U.S.C. 103(e)(2), but does not include 1,311 miles designated under 23 U.S.C. 139(a).

the cost to incorporate the latest safety features, and to provide essential environmental requirements in order to mitigate environmental effects such as air, noise, and water pollution. Where items of work are not eligible for Interstate construction funding but are required to meet design standards, the work is still eligible for Interstate funding in the form of Interstate 4R funding. The Federal-Aid Highway Act of 1981 changed the resurfacing, restoration, and rehabilitation (RRR) program to a new post-Interstate construction program (4R program) by adding "reconstruction" to the definition of eligible work. Increased funding levels through fiscal year 1992 were provided by the 1981 Act and subsequent legislation. The Interstate program is considered a "dual funded" program (initial construction and Interstate 4R program). This estimate includes only work considered "initial construction" under existing administrative policies governing the use of Interstate construction funds, and excludes the costs of 4R work which, under Section 102(c) of the 1976 Federal-Aid Highway Act, are not eligible for participation with Interstate construction funds.

The interchange of information and instruction on a national basis, together with the liaison between the State highway personnel and Federal Highway Administration (FHWA) personnel at division and regional levels during preparation of the estimate, provided the means of achieving uniformity.

This estimate, prepared on the basis of a uniform set of rules applied uniformly throughout the States, results in a report of estimated costs to complete the Interstate System which is a sound reflection of the relative needs of the several States and an equitable basis for apportioning funds among the States to ensure that all States may pursue timely completion of their portion of the System. It remains, however, an estimate based upon the best engineering judgement of the State highway departments and the FHWA of what it would cost at this date to complete the designated Interstate System if construction were performed at the unit prices of calendar year 1987. In applying the governing guidelines and engineering judgement in the development of this estimate, the latest plans available at the time were used in the estimate preparation. In accordance with the Federal-Aid Highway Act of 1981, in Section 4(b), our instructions specifically prohibited inclusion of design concepts, locations, and other construction features not included in the 1981 estimate unless approved pursuant to that section, or otherwise. However, costs for minor design refinements have been included.

The individual estimates of the several States, or the estimates of individual routes within a State, although prepared on a uniform basis and reflecting uniform design criteria, will not result in uniform construction costs per mile of highway, uniform right-of-way costs per mile, or uniform average values among the States for any other remaining work. A comparison of such averages is meaningless because of the wide variation of conditions of traffic, topography, climate, status of development, and other factors peculiar to the section of highway being considered.

Within the scope of practical uniformity there is a balance between traffic needs in a particular circumstance and the highway design used to satisfy that need. There is, and there has to be, provision for some range and variation in design to properly reflect the many varying factors involved under different local conditions. Uniformity in this sense, therefore, means the application in all States of the design range provided in the geometric design standards approved for the Interstate System pursuant to 23 U.S.C. and within the limitations of the eligibility provisions in Section 4(b) of the 1981 Act.

PREPARATION OF THE ESTIMATE AND THE BASIC PRINCIPLES AND PROCEDURES FOLLOWED

The estimate of the cost of completing the Interstate System was prepared in each State by personnel of the State highway department and the division office of the FHWA. Representatives from the FHWA regional offices worked closely with the State and division office personnel in its preparation. Representatives from FHWA Headquarters traveled to many of the States during the course of the estimate preparation. These trips at periodic intervals by individuals who had traveled in other regions on the estimate review helped to provide the interregional inspection and correlation necessary to assure a high level of uniformity on a nationwide basis.

Each State assembled its estimate in a bound volume following a standard format which included maps showing the location of the Interstate segments being estimated in that State, plates showing the engineering features, and tables listing the design criteria, route section mileages, and estimated costs for each section, broken down into major elements of construction. Arkansas, Delaware, Iowa, Kansas, Maine, Nebraska, Nevada, New Hampshire, New Mexico, North Dakota, South Dakota, Vermont, Wisconsin, and Wyoming, however, submitted abbreviated estimates because they have minimum or no eligible costs to report.

In preparing this estimate of the cost of completing the Interstate System, the date January 1, 1988, was selected as the cutoff date, and all Federal-aid work on which the FHWA had authorized the State to proceed as of the close of books for the month of December 1987 was considered as having been completed under the financing arrangements then in effect. This means that the cost of any work on the Interstate System which was to be accomplished with funds already assigned (obligated) for construction has not been included in this estimate. Similarly, right-of-way costs and preliminary engineering costs for which authorization to proceed had been given and funds obligated as of January 1, 1988, are not included in this revised estimate of the cost of completing the Interstate System.

In providing a uniform basis for estimate preparation, it was necessary to select a common base period for the unit construction prices to be used in the estimate. The unit prices for this estimate are based on weighted average low bid prices in the State for construction awarded to contract during the calendar year 1987. Thus, the price base used represents the most recent data available at estimate preparation time.

Each State's estimate, when completed, was forwarded through the field offices of the FHWA to the Washington Headquarters where the estimates have been reviewed and evaluated for submission of this report to the Congress.

COST SUMMARIES AND APPORTIONMENT FACTORS

The data summarized in the following tables are derived from material presented in the State reports as well as from other fiscal information. Table 3 lists by States the amounts of unobligated Interstate Construction (IC) balances (not yet assigned to projects) as of January 1, 1988, together with the corresponding estimated amount of State matching funds, adjusted to reflect lapsed fiscal year 1988 and 1989 funds; apportionment of FY 1990 funds; transfer of IC funds to I-4R under 23 U.S.C. 119; and allocations of Interstate discretionary funds through October 1988. The amounts just described have been included in adjustments to the estimate of the cost to complete the Interstate System in order to arrive at the net cost figures to be used in establishing the factors for apportionment of funds authorized by subsection (b) of Section 108 of the Federal-Aid Highway Act of 1956, as amended.

Table 4 lists the estimates of costs by the States for all work not in authorized status as of January 1, 1988, which is deemed necessary to complete the Interstate System. In addition, there is tabulated the cost of work which has been accomplished on the Interstate System by States, under the provisions 23 U.S.C. 115 ("Construction by States in Advance of Apportionment -- Interstate System"), Section 122 ("Payment to States for Bond Retirement") and Section 108(c) ("Advance Right-of-Way Acquisition"), which costs are ultimately to be reimbursed in part with Federal funds in the statutory ratio at the time of project authorization. The costs of work not financed -- not in authorized status -- as of January 1, 1988, are shown in three categories: (1) preliminary engineering, (2) right-of-way, and (3) construction. The summation of costs of these three elements of work plus the cost of projects undertaken in advance of apportionment of Interstate funds, less the total amounts already available, (shown in Table 3) which take into consideration all apportionments, allocations, etc. through October 31, 1988, represent the remaining costs to be financed with Interstate construction funds and State matching funds to complete the Interstate System as estimated in detail by the States for apportionment factor purposes. The ratio of the Federal share of this cost in each State to the sum of the Federal share of these costs in all the States determines the factors recommended for use in the apportionment of funds.

Table 5 shows in summary the remaining costs in each State as set forth in Table 4, the Federal share of these costs, and the resulting apportionment factor for each State. This table reflects apportionment factors computed in the same manner as in previous Interstate Cost Estimates.

TABLE 3
AMOUNTS NOT INCLUDED IN COSTS USED TO DETERMINE APPORTIONMENT FACTORS IN 1989 ESTIMATE
(in thousands of dollars)

STATE	ADJUSTED UNOBLIGATED BALANCE INTERSTATE FUNDS *	ESTIMATED STATE FUNDS TO MATCH UNOBLIGATED BALANCE INTERSTATE FUNDS	TOTAL
ALABAMA	330,516	36,724	367,240
ALASKA	26,647	1,482	28,129
ARIZONA	64,707	3,933	68,640
ARKANSAS	35,878	3,986	39,864
CALIFORNIA	783,117	72,188	855,305
COLORADO	175,678	16,930	192,608
CONNECTICUT	249,230	27,692	276,922
DELAWARE	32,440	3,604	36,044
DIST. OF COL.	92,155	10,239	102,394
FLORIDA	393,985	43,776	437,761
GEORGIA	159,978	17,775	177,753
HAWAII	298,705	33,189	331,894
IDAHO	145,016	12,200	157,216
ILLINOIS	34,148	3,794	37,942
INDIANA	27,449	3,050	30,499
IOWA	38,548	4,283	42,831
KANSAS	25,600	2,844	28,444
KENTUCKY	52,994	5,888	58,882
LOUISIANA	289,830	32,203	322,033
MAINE	34,773	3,864	38,637
MARYLAND	274,246	30,472	304,718
MASSACHUSETTS	478,094	53,122	531,216
MICHIGAN	146,865	16,318	163,183
MINNESOTA	258,569	28,730	287,299
MISSISSIPPI	39,699	4,411	44,110
MISSOURI	34,700	3,856	38,556
MONTANA	19,967	1,927	21,894
NEBRASKA	38,843	4,316	43,159
NEVADA	31,886	1,678	33,564
NEW HAMPSHIRE	16,957	1,884	18,841
NEW JERSEY	328,819	17,561	346,380
NEW MEXICO	28,137	2,272	30,409
NEW YORK	70,984	7,887	78,871
NORTH CAROLINA	199,855	22,206	222,061
NORTH DAKOTA	32,756	3,640	36,396
OHIO	34,921	3,880	38,801
OKLAHOMA	24,051	2,672	26,723
OREGON	41,860	3,536	45,396
PENNSYLVANIA	456,222	50,691	506,913
RHODE ISLAND	27,597	3,066	30,663
SOUTH CAROLINA	23,284	2,587	25,871
SOUTH DAKOTA	36,406	3,561	39,967
TENNESSEE	36,442	4,049	40,491
TEXAS	261,828	29,092	290,920
UTAH	143,767	9,238	159,005
VERMONT	34,730	3,859	38,589
VIRGINIA	252,742	28,082	280,824
WASHINGTON	490,076	50,548	540,624
WEST VIRGINIA	32,235	3,582	35,817
WISCONSIN	37,186	4,132	41,318
WYOMING	25,935	2,033	27,968
TOTAL	7,257,053	744,532	8,001,585

* Unobligated balances as of 12-31-87 adjusted to reflect the fiscal year 1990 apportionment, and discretionary allocations, fund transfers, and lapses through 10-31-88.

TABLE 4 - NATIONAL SUMMARY OF ESTIMATED COSTS TO COMPLETE SYSTEM, 1969 ESTIMATE, AS OF DECEMBER 31, 1967 (In thousands of dollars)

STATE	PRELIMINARY ENGINEERING	RIGHT-OF-WAY	CONSTRUCTION	BONDS, ADVANCE CONSTRUCTION, AND ADVANCE RIGHT OF WAY ACQUISITION PROJECT OBLIGATIONS	SUBTOTAL	AMOUNTS ALREADY MADE AVAILABLE (FROM TABLE 3)	ESTIMATED FEDERAL-AID AND STATE MATCHING FUNDS REQUIRED TO COMPLETE SYSTEM
ALABAMA	13,918	66,870	634,751	10,056	725,595	367,240	358,355
ALASKA	0	0	0	0	0	28,129	0
ARIZONA	811	0	46,394	18,421	65,926	68,640	0
ARKANSAS	0	0	0	0	0	39,864	0
CALIFORNIA	7,926	266,747	1,764,490	0	2,029,163	855,305	1,173,858
COLORADO	37,642	17,468	338,251	1,200	394,561	192,606	201,953
CONNECTICUT	0	52,172	619,964	0	672,126	276,922	395,204
DELAWARE	0	0	0	0	0	36,044	0
DIST. OF COL.	7,149	18,950	213,658	0	239,757	102,394	137,363
FLORIDA	7,264	140,437	447,697	169,701	765,099	437,761	327,338
GEORGIA	0	66	94,829	266,712	361,607	177,753	183,854
HAWAII	10,863	4,266	691,903	20	707,052	331,894	375,158
IDAHO	2,579	1,621	155,104	2,099	161,403	157,216	4,187
ILLINOIS	74	0	25,756	11,558	37,388	37,942	0
INDIANA	0	1,200	43,134	0	44,334	30,499	13,835
IOWA	0	0	0	0	0	42,831	0
KANSAS	0	0	0	0	0	28,444	0
KENTUCKY	0	17,468	125,981	1,345	144,764	58,882	85,882
LOUISIANA	742	36,574	540,541	0	577,857	322,033	255,824
MAINE	0	0	0	0	0	38,637	0
MARYLAND	0	83,151	541,696	145,202	770,049	304,718	465,331
MASSACHUSETTS	113,243	415,351	2,625,179	0	3,153,773	531,216	2,622,557
MICHIGAN	2,533	1,414	248,692	27,973	280,612	163,183	117,429
MINNESOTA	4,745	22,083	302,194	42,140	371,162	287,298	83,863
MISSISSIPPI	707	0	20,373	20	21,100	44,110	0
MISSOURI	0	0	2,880	0	2,880	38,556	0
MONTANA	0	0	0	2,573	2,573	21,894	0
NEBRASKA	0	0	0	0	0	43,150	0
NEVADA	0	0	0	0	0	33,564	0
NEW HAMPSHIRE	0	0	0	0	0	18,841	0
NEW JERSEY	3,167	8,641	728,049	67,071	806,918	348,380	468,538
NEW MEXICO	0	0	0	0	0	30,409	0
NEW YORK	3,129	19,454	112,347	13,841	148,771	78,871	69,900
NORTH CAROLINA	0	16,356	348,743	40	365,139	222,061	143,077
NORTH DAKOTA	0	0	0	0	0	36,396	0
OHIO	1,221	7,216	159,300	50	167,787	38,801	128,986
OKLAHOMA	0	0	48,644	0	48,644	26,723	21,921
OREGON	8,577	8,373	114,336	0	131,286	45,796	85,490
PENNSYLVANIA	5,207	9,138	236,236	837,983	950,564	506,913	443,651
RHODE ISLAND	0	45	5,971	10	6,026	30,863	0
SOUTH CAROLINA	1,002	2,038	53,536	2,503	59,079	25,871	33,208
SOUTH DAKOTA	0	0	0	0	0	39,967	0
TENNESSEE	3,145	13,120	55,008	0	71,273	40,491	30,782
TEXAS	7,442	7,302	530,854	71,149	616,747	290,920	325,827
UTAH	126	0	169,872	0	169,998	159,005	10,993
VERMONT	0	0	0	0	0	38,589	0
VIRGINIA	0	3,161	342,885	35,004	381,051	280,824	100,227
WASHINGTON	44,119	35,330	744,992	0	824,441	540,624	283,817
WEST VIRGINIA	16	0	0	4,400	4,416	35,817	0
WISCONSIN	0	0	0	0	0	41,318	0
WYOMING	0	0	0	0	0	27,988	0
TOTAL	287,337	1,276,601	13,186,291	1,531,071	16,281,308	8,001,585	8,941,408

TABLE 5 - ESTIMATED FEDERAL-AID AND STATE MATCHING FUNDS TO COMPLETE THE SYSTEM AND APPORTIONMENT FACTORS FOR DISTRIBUTION OF 1991 AND 1992 FISCAL YEAR AUTHORIZATIONS

STATE	ESTIMATED FEDERAL-AID AND STATE MATCHING FUNDS REQUIRED TO COMPLETE SYSTEM (THOUSANDS)	ESTIMATED FEDERAL SHARE OF FUNDS REQUIRED TO COMPLETE SYSTEM (THOUSANDS)	APPORTIONMENT FACTORS (PERCENT)
ALABAMA	358,355	322,520	3.984
ALASKA	0	0	0.000
ARIZONA	0	0	0.000
ARKANSAS	0	0	0.000
CALIFORNIA	1,173,858	1,074,784	13.277
COLORADO	201,953	184,201	2.276
CONNECTICUT	395,204	355,684	4.394
DELAWARE	0	0	0.000
DIST. OF COL.	137,363	123,627	1.527
FLORIDA	327,338	294,604	3.639
GEORGIA	183,854	165,469	2.044
HAWAII	375,158	337,642	4.171
IDAHO	4,187	3,862	0.048
ILLINOIS	0	0	0.000
INDIANA	13,835	12,452	0.154
IOWA	0	0	0.000
KANSAS	0	0	0.000
KENTUCKY	85,882	77,294	0.955
LOUISIANA	255,824	230,242	2.844
MAINE	0	0	0.000
MARYLAND	465,331	418,798	5.174
MASSACHUSETTS	2,622,557	2,360,301	29.157
MICHIGAN	117,429	105,686	1.306
MINNESOTA	83,863	75,477	0.932
MISSISSIPPI	0	0	0.000
MISSOURI	0	0	0.000
MONTANA	0	0	0.000
NEBRASKA	0	0	0.000
NEVADA	0	0	0.000
NEW HAMPSHIRE	0	0	0.000
NEW JERSEY	460,538	437,189	5.401
NEW MEXICO	0	0	0.000
NEW YORK	69,900	62,910	0.777
NORTH CAROLINA	143,077	128,769	1.591
NORTH DAKOTA	0	0	0.000
OHIO	128,986	116,087	1.434
OKLAHOMA	21,921	19,729	0.244
OREGON	86,490	79,752	0.985
PENNSYLVANIA	443,651	399,286	4.932
RHODE ISLAND	0	0	0.000
SOUTH CAROLINA	33,208	29,887	0.369
SOUTH DAKOTA	0	0	0.000
TENNESSEE	30,782	27,704	0.342
TEXAS	325,827	293,244	3.623
UTAH	10,993	10,354	0.128
VERMONT	0	0	0.000
VIRGINIA	100,227	90,204	1.114
WASHINGTON	283,817	257,280	3.178
WEST VIRGINIA	0	0	0.000
WISCONSIN	0	0	0.000
WYOMING	0	0	0.000
TOTAL	8,941,408	8,095,038	100.000

COMPARISON OF 1987 AND 1989 ESTIMATES OF TOTAL SYSTEM COSTS

This cost comparison is developed by comparing the total system cost, from its beginning to its completion, as reflected in two Interstate cost estimates: the 1989 estimate and the 1987 estimate. This analysis reflects total cost which includes not only construction but funds provided for FHWA administration and research, metropolitan planning, State highway planning and research, the Strategic Highway Research Program (SHRP) and demonstration projects authorized by Section 149(d) of the 1987 STURAA.

The estimated total cost for the Interstate System, as developed from the estimate submitted in January 1987 was $121.0 billion, of which $107.6 billion was the estimated Federal share. The 1989 total estimated cost without allowance for possible escalation in future program years is $124.9 billion, of which $111.0 billion is the estimated Federal share. This represents an increase of $3.9 billion in total cost of the Interstate System including construction, planning and research, FHWA administration and contingencies. These costs are shown in Table 6. Also, as shown in Table 6, the remaining cost-to-complete the Interstate System is $16.3 billion, of which $14.8 billion is the Federal share. Approximately 46 percent of this remaining cost is for work yet to be accomplished on sections of the System which are already serving traffic. Such work, eligible under the Federal-Aid Highway Act of 1981, generally includes remaining phases of initial construction, major upgrading of segments incorporated into the System and which were not built with Interstate funds, and added lanes (mixed traffic and high occupancy vehicle) on open-to-traffic sections.

Table 7 presents a comparison between the estimated construction costs as now submitted to the Congress and the 1987 estimate furnished the Congress in January 1987. The table reflects a net $3.767 billion increase in the construction cost of the system since the 1987 estimate. As shown in the cost change analysis following Table 7, that increase results from (1) an increase of $1.4 billion due to additional eligibility in the 1987 STURAA and in PL 100-457; (2) an increase of $0.9 billion due to higher unit prices for work remaining to be completed; (3) an increase of $0.3 billion due to social, economic and environmental considerations; and (4) an increase of $1.3 billion for preliminary engineering, right-of-way and construction items.

TABLE 6 - ESTIMATED TOTAL COST OF THE INTERSTATE SYSTEM

(In millions of dollars)

	Total Cost	Federal Funds
1989 cost estimate for designated System of 42,797 miles Remaining to complete as of Jan. 1, 1988 (Table 4)	16,281	14,751
Total obligations prior to Jan. 1, 1988	104,204	92,151
Subtotal for construction cost of the 42,797-mile System	120,485	106,902
State highway planning and research	1,850	1,667
Metropolitan planning	380	338
FHWA Administration and Research/SHRP	1,992	1,992
Contingencies	193	101
GRAND TOTAL	124,900	111,000

TABLE 7 - COMPARISON OF THE 1987 AND THE 1989 ESTIMATES OF TOTAL COST OF THE INTERSTATE SYSTEM

(In millions of dollars)

	1987		1989	
	Total Cost	Federal Share	Total Cost	Federal Share
Construction of Interstate Mileage in State Estimate:				
1987 Estimate (42,796 miles)	116,718*	103,549*	---	---
1989 Estimate (42,797 miles)	---	---	120,485	106,902
State highway planning and research	1,792	1,626	1,850	1,667
Metropolitan planning	356	323	380	338
FHWA administration and research/SHRP	1,966	1,966	1,992	1,992
Contingencies	168*	136*	193	101
GRAND TOTAL	121,000*	107,600*	124,900	111,000

* Revised 1987 ICE totals to correctly show amounts obligated for completion work which was overstated by some $700 million (Federal funds). Minimum one-half percent funds actually expended on non-Interstate completion work were inadvertantly included in the 1987 ICE obligations.

The following is a brief summary and tabulation of the costs which account for the difference between the 1987 and 1989 estimates of the total cost of construction.

	Cost Change Between 1987 and 1989 Estimates (Millions)	
System adjustments:	$	
(a) Major system withdrawals and adjustments and fund transfers	-59	
New Legislation:		
(b) Additional eligibility due to provisions of the Surface Transportation and Uniform Relocation Assistance Act of 1987 and the Department of Transportation and Related Agencies Appropriations Act, 1989	1,353	
Unit price changes:		
(c) Changes in total cost attributable to the increase in unit prices between the base year 1985 and the base year 1987	868	
Increased emphasis on social, economic, and environmental considerations:		
(d) Changes due to social, economic, or environmental impact considerations including noise abatement measures, replacement parkland, landscaping, and special design features	325	
Subtotal		2,487
Preliminary engineering and right-of-way:		
(e) Change in right-of-way costs for segments and features not included in items (a) and (c)	285	
(f) Change in preliminary engineering costs for segments and features not included in items (a) and (c)	84	
Subtotal		369

		Cost Change Between 1987 and 1989 Estimates (Millions)	
Construction items:		$	
(g)	Changes due to design changes and refinements for roadway items on unbuilt sections and on major upgrading projects	384	
(h)	Additional interchanges and grade separations that have been approved for inclusion in the System since the 1987 estimate	266	
(i)	Changes to structure designs, railroad grade separations, highway grade separations, viaducts, and other bridges and tunnels	88	
(j)	Changes in the cost on additional lane projects from those reported in the 1987 estimate.	-20	
(k)	Construction project overruns; includes an increase in costs on projects in authorized status on January 1, 1988, due to unforeseen conditions or circumstances	193	
	Subtotal		911
	Total		3,767

Table 8 summarizes the status of Interstate authorizations and apportionments versus the current estimate of Interstate needs. This table shows that the currently authorized funds for initial construction are short by $0.3 billion in covering the cost of the System as reflected in this estimate. The table also shows that additional apportionments of $7.9 billion are required to complete the initial construction of the Interstate System. Adjustments to the authorizations and apportionments reflecting amounts not available for Interstate purposes have been identified in Table 8.

TABLE 8 - AUTHORIZATION AND APPORTIONMENT STATUS

	Millions
Authorizations	
Total amounts authorized for initial construction by the 1954 and subsequent Federal-Aid Highway Acts and the 1987 Surface Transportation and Uniform Relocation Assistance Act chargeable to the Highway Trust Fund	$113,784
Less amounts not available for initial Interstate construction 1/	3,088
Remaining authorized amount	110,696
Current estimate of needed Interstate authorization for initial construction	111,000
Estimated additional Federal funds needed to be authorized	304
Apportionments:	
Total apportionments for fiscal years through 1990 for initial construction chargeable to the Highway Trust Fund	106,169
Less amounts not available for initial Interstate construction 1/	3,088
Remaining apportioned amounts	103,081
Current estimate of needed Interstate apportionments for initial construction	111,000
Estimated apportionment required for 1991 and later fiscal years for initial construction	7,919

1/ Represents Interstate apportionment transfers and reductions of $918.0 million pursuant to 23 USC 103(e)(4); $1,150.8 million pursuant to Sections 104(b)(1) of the 1978 STAA, 103(a) of the 1982 STAA and 102(c) of the 1987 STURAA; $51.3 million pursuant to Section 218 of the Urgent Supplemental Apportionment Act of 1982; $586.5 million pursuant to 23 U.S.C. 119(d); $49.6 million pursuant to Section 7 of PL 98-229; $164.3 million pursuant to PL 99-190; $1.8 million pursuant to Section 9(d) of the Federal Aid Highway Act of 1981; $23.3 million for Strategic Highway Research Program pursuant to 23 U.S.C. 307(d)(4); and $142.2 million for demonstration projects pursuant to Section 149(d) of the 1987 STURAA.

CONCLUSION

The estimated cost of completing the Interstate System, which is to be borne by the Highway Trust Fund and State matching funds, and the apportionment factors contained herein have been computed in accordance with 23 U.S.C. The 1989 estimates are sound engineering appraisals of the cost to complete the Interstate System in each State based on 1987 price levels but do not represent a commitment of funds to the location, design, or cost of individual projects to be undertaken on the System. Before construction, individual projects on the System covered by this estimate will be studied further by the State highway departments and FHWA in preparing the detailed designs, plans and specifications on which actual construction bids will be invited.

The $3.767 billion increase in the total cost to complete eligible work on the System as reported in this estimate results from increased eligibility as a result of legislation, higher construction and right-of-way costs on projects included in the 1989 estimate, increases in the non-Interstate construction use of funds, and increases due to design refinements including environmental features.

The 1987 Interstate Cost Estimate, transmitted on January 1987, was approved by Congress for the purpose of apportioning fiscal year 1988 funds. The apportionment of fiscal year 1989 and 1990 funds was made after the 1987 estimate was administratively adjusted in accordance with Section 102(b)(2) of the 1987 STURAA. This estimate, the 1989 Interstate Cost Estimate, is a revision to the 1987 Interstate Cost Estimate. As with the 1987 estimate, it has been prepared in accordance with the provisions of 23 U.S.C., and other applicable laws and regulations and presents only costs for work necessary to complete initial construction of the System to a minimum level of acceptable service pursuant to the Federal-Aid Highway Act of 1981. The 1989 estimate, however, reflects the most current estimate of each State's current needs and the resultant apportionment factors listed in Table 5 represent a sound basis for apportioning Interstate construction funds.

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